Transportation Synthesis Report

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Highway Construction: Program and Project Performance Measures

Prepared for
Bureau of Highway Construction
Division of Transportation Infrastructure Development

Prepared by
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Transportation Synthesis Reports (TSRs) are brief summaries of currently available information on topics of interest to WisDOT technical staff in highway development, construction and operations. Online and print sources include NCHRP and other TRB programs, AASHTO, the research and practices of other state DOTs, and related academic and industry research.

Request for Report

Coordinating the schedules, resources and budgets of a statewide construction program is a complex task. The WisDOT Bureau of Highway Construction is interested in practical strategies used by other states to maintain the stability of individual construction projects as well as of the annual program as a whole. The RD&T Program was asked to identify best practices that might be useful to WisDOT.

Summary

Using performance measures to evaluate progress toward predetermined goals helps DOTs detect and correct problems, improve processes, increase program stability and document accomplishments. State construction bureaus use a variety of different measures to track goals that are important to them. Successful systems tend to include a limited set of key measures that can be translated into clear program-level reports, which are then used to evaluate trends and shift resources as needed to address problems. See Transportation Performance Measures, FHWA Office of Operations at http://ops.fhwa.dot.gov/Travel/Deployment_Task_Force/perf_measures.htm.

We reviewed performance measure systems used by California, Florida, Missouri, Oregon, Michigan, Maine and Virginia, and divided their approaches into three sections: **Performance Measures, Program/Project Management Systems** and **Other Systems.** State DOTs' solutions include:

- Program-wide performance measures that assess progress toward specific numerical targets.
- Project- and program-level reports, generated from systemwide data, that allow project managers to spot problems at a glance and shift resources appropriately, increasing overall program stability.
- Comprehensive software packages that coordinate data across functions and offer a continuous view of projects' progress at multiple levels of detail.

State Practices

California

1995 Performance Report, Caltrans, 1995
http://www.dot.ca.gov/hq/projmgmt/perf_report95a.htm
Caltrans developed a three-tiered set of Capital Support Performance Measures in 1995: **corporate measures** addressing the overall state of transportation in California, **program measures** focusing on the health of the department's programs, and **project-level operational measures**. This document describes the background behind the measures' creation and summarizes the measures as originally proposed.

2001–02 Performance Report, Caltrans, 2002
http://www.dot.ca.gov/hq/projmgmt/perf_report01_02a.htm
The department's latest annual performance report includes charts and text demonstrating how Caltrans is meeting the goals established in the Capital Support Performance Measures. (Click "Next Page" at the bottom for construction-related measures.) Performance measures tracked include:

- Percent of programmed projects for which design is completed on schedule (target of at least 90%)
- Percent of programmed projects designed, measured in terms of dollars delivered (target of at least 100%; values are often greater than 100% because delayed projects are replaced by other projects that are completed early)
- Actual time for contract completion, excluding weather days, expressed as a percentage of the original allotted days at the time of the contract award (target of less than 110%)
- Number of projects delivered within their programmed amount, calculated as the contractor's bid amount expressed as a percentage of the amount estimated in the programming documents for each project (target range of 85 to 100%)
- Proposed final estimate for projects completed in a fiscal year, measured as a percentage of award allotment value (target of less than 100%)
- Final estimate for projects finalized in a fiscal year, measured as a percentage of the proposed final estimate of those projects (target of less than 103%)
- Environmental, design and right of way work for projects awarded in a fiscal year, measured as a percentage of the total project development support cost estimated in the programming documents for those projects (target range of 80 to 100%)
- Construction support work for projects with proposed final estimates in a fiscal year, measured as a percentage of the total construction support cost estimated in the programming documents for those projects (target range of 80 to 100%)

Page 3 of the report lists **formulas** used to translate the program-level performance measures into corporate indicators that inform departmentwide performance measures. These include:

- **Capital cost growth indicator:** Final estimate for all projects divided by total programmed dollars (target range of 85 to 100%). This composite index combines three program-level performance measures to indicate the department's overall success in planning and delivering projects within budget over the entire project life cycle.
- **Time growth indicator:** Number of projects completed in a fiscal year divided by number of projects scheduled for completion (target of at least 90%)
- **Support cost indicator:** Actual project development support costs plus actual construction support costs, divided by programmed project development support costs plus programmed construction support costs (target range of 80 to 100%). This index is a weighted average of two program-level performance measures used to indicate the department's overall success in keeping total support expenditures within project support budgets.

Florida
Quarterly Performance Measures Summary Report, Florida DOT, FY 2001–02
http://www.dot.state.fl.us/construction/CONSTADM/reports/perfmeas/qtrperformance%20main.htm
Florida DOT's Construction Office publishes the progress of all contracts against performance measures on a quarterly basis. Measures tracked include:

- Increase in time spent on a project over days planned, expressed as a percentage of original days planned (target of 20% or less)
- Increase in cost (based on actual expenditures) over the original contract amount, expressed as a percentage of the original contract amount (target of 10% or less)
- Total cost for all construction engineering inspection, expressed as a percentage of the present contract amount (target of 12% or less)
- Added cost of all contract changes that could have been avoided, expressed as a percentage of the original contract amount (target of 1% or less)

- Days added to the contract for all contract changes that could have been avoided, expressed as a percentage of original contract days (target of 5% or less)
- Number of days between the contract final accepted date and the date of initial final offer of payment by the department (target of 90 days or less)
- Number of days between the contract final accepted date and the contract pass date (target of 275 or less)

FDOT's fourth-quarter report includes data for the entire fiscal year, and tracks three additional measures:

- Percent of contracts with interest paid (target of 5% or less)
- The state construction program's performance in the department's customer satisfaction survey (target of 80% or greater)
- Grade received from the Maintenance Office on new construction contracts included in its annual survey (target of 95% or greater)

At the district level, at least one FDOT district allows the public to generate online reports on its progress toward meeting construction performance measures. These measures vary from FDOT's program-level performance measures. Two measures tracked by District 1 are percent of plans distributed within two business days of receipt (target of at least 90%) and percent of cost overruns resulting from unincorporated comments (target of less than 10% of contract changes). To generate a report displaying all performance measures, go to http://www.fdotd1-cpmts.com/ and log in as a guest. Click "Performance Measures," then choose a date range and an office, and click "Table."

Missouri
MoDOT Dashboard: Measurements of Performance, MoDOT, June 2003
http://www.modot.state.mo.us/about/DashboardPerformanceMeasures.htm
The MoDOT Dashboard is not a Web-based system like Virginia's Dashboard (see **Other Systems** below), but rather a semiannual report on the department's performance against key measures. (Click the link at the bottom of the page to download the report; see pages 18 to 21 of the PDF for construction performance measures.) The performance measures are part of three department goals: take better care of what we have, finish what we've started, and build public trust. The report ranks performance using green, yellow and red indicators (green signifying that the target was met or exceeded, yellow that the trend was positive but the target was not met, and red that the trend was negative and the target was not met). Construction performance measures tracked include:

- Percentage of dollars awarded compared to dollars programmed for award, per quarter (target of delivery within 5% of dollars programmed)
- Percentage of projects awarded in the same fiscal year programmed (target of delivery of within 5% of the number of projects programmed)
- Percentage of projects completed on time as specified in the project contract (target of at least 85%)
- Percentage of annual total dollars spent on completed projects compared to total dollars programmed for those projects (target of within 3% of total dollars programmed)

Oregon
Information Item: Construction Performance Measures, AASHTO
http://quality.transportation.org/community/quality/portal.nsf/0/86642d61b552e24c86256cdf007968d2?OpenDocument
This item is from AASHTO's Quality Information Center. It reports that Oregon DOT's construction program has set performance measures and produces trend-line reports that identify areas to be improved. Contact: Norma Kearney, Contract Administration, Contract Services, Oregon Department of Transportation, 503-986-3027, norma.l.kearney@odot.state.or.us

Program/Project Management Systems

In the last 10 to 15 years, several state DOTs have implemented Program/Project Management System software to coordinate projects and programs, integrating information that was previously stored in several different systems across the organization. Virginia DOT also recently designed a program that draws information from several VDOT computer systems and displays it on the department's Web site.

Michigan

Michigan DOT Ramps Up Highway Program's On-Time Delivery, Robbins-Gioia, LLC

http://www.robbinsgioia.com/library/casestudies/MDOT.pdf

This case study describes the Program/Project Management System implemented by Michigan DOT in the mid-1990s. The system provides summary data on all projects and programs, accurate resource requirements and availability data for reality-based scheduling, and proactive monitoring and control capabilities to track project status and costs. The system's program management capabilities allow MDOT managers to optimize scheduling and resources, reducing overtime requests and increasing program stability. The software uses a UNIX-based client/server system. In Fiscal Year 1996, MDOT identified $854,100 in cost savings on 219 projects using the system.

MDOT's "Preconstruction Process Documentation Manual" (2001) is available for purchase for $11. It contains descriptions of the tasks used in the P/PMS, including those used in the bidding, scheduling, billing and payroll systems for tracking resources and project progress. See http://www.michigan.gov/mdot/1,1607,7-151-9622_11044_11351-26288--,00.html .

Maine

Xybernaut Solutions, Inc.

http://www.xybernautsolutions.com/ (Click "Products & Services" in the left nav bar, then click "Project Management," then "Program/Project Management Systems," then "[1] Management Systems' details" at the bottom of the page.)

Located in Fairfax, Va., Xybernaut Solutions has developed P/PMS systems for several state DOTs, including Maine, New York, New Mexico, Minnesota, Tennessee, Louisiana and Montana. Similar in purpose to the Michigan DOT software described above, Xybernaut's P/PMS is a blend of commercially available and custom-developed software that integrates task, project and funds management. The software can be integrated with GIS, Finance and AASHTOware products.

Program/Project Management: "The New York Solution," Maine DOT, September 1998

http://www.state.me.us/newsletter/backissues/sep98/programproject_management.htm

This article in Maine DOT's employee newsletter describes Maine's decision to use the P/PMS system after researching other states' processes. It mentions that New York DOT was willing to transfer its $2.5 million P/PMS system to other states at no cost, and Maine planned to spend less than $1 million to modify the system for its needs.

Other Tracking Systems

Virginia

Press release: VDOT Develops One-Stop Source for Project Status, Virginia DOT, August 2002

http://virginiadot.org/infoservice/news/CO08152002-dashboard.asp

Virginia DOT's public Dashboard project tracking system debuted online in March 2003. Originally designed as an internal tool but now available to the public, the Dashboard monitors project advertisement schedules, project budgets and schedules, and work orders. It combines data from several VDOT databases and rates each project's status according to the red, yellow and green colors of a traffic signal (green signifying a project is on track, yellow at risk, and red behind schedule). The site's home page shows the number of projects at each level statewide. VDOT commissioner Philip Shucet says the system was developed in-house with no extra money spent beyond normal employee wages.

Find the system itself at http://dashboard.virginiadot.org/, and see more detail on how ratings are determined at http://virginiadot.org/projects/faq-dashboard.asp.

Other Resources

AASHTO

Strategies for Reducing Highway Project Delivery Time and Cost, AASHTO, December 2003

http://downloads.transportation.org/Quality-FinalReport_Partnering.pdf

WisDOT was one of 10 state DOTs consulted in the research for this AASHTO report. Pages 13–14 of the PDF (12–13 of the report) address project tracking systems, noting that states vary in the way they track construction schedules and in what constitutes a delayed project. South Carolina and New Jersey DOTs were identified as having best practices in this area:

- South Carolina DOT implemented a **Preconstruction Project Management System** in 1987 that addresses the complex interrelationship of projects, work activities, people and funding. In 2002, SCDOT moved to a system using **Primavera scheduling software** (www.primavera.com), a flexible system that interfaces with the department's in-house resources and other software programs, allowing managers to schedule preconstruction activities on a district- or statewide basis.
- New Jersey DOT uses a Primavera-based system to track schedules and budgets for design and construction projects. Once a baseline schedule is set, it cannot be changed. NJDOT also uses a **rating system** that rewards contractors with bonuses for completion ahead of schedule and penalizes them for poor performance. Other rating factors include safety, environmental compliance, safety and air voids. The tracking and rating systems have led to a 90% overall on-time rate.